

**WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY**  
Control No. (TCN) 08152 with Battelle Chapel Hill Operations for the U.S. Army Environmental Policy Institute

**OCTOBER 2009 REPORT**

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**Item 1. UN Treaty on Maritime Goods Transportation Opened for Signature**

The new UNCITRAL Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea, known as the “Rotterdam Rules”, provides a legal framework governing the international carriage of goods by sea and industry practices. 90% of world trade travels in part by ocean transport. The Convention sets clear global rules for rights and obligations, liability and redress of all parties involved in shipping goods by sea. Adopted by the General Assembly in December 2008, the Rotterdam Rules opened for signature on September 23, 2009 and need 20 ratifications for entry into force. To date, it already has 20 signatories (including the U.S.) representing over 25% of current world trade volume.

**Military Implications:**

The military and its contractors should see how the new Rotterdam Rules influence their activities and be prepared to fully comply with the new regulation.

**Sources:**

United Nations Convention on Contracts for the International Carriage of Goods Wholly or Partly by Sea - the "Rotterdam Rules"

[http://www.uncitral.org/uncitral/en/uncitral\\_texts/transport\\_goods/2008rotterdam\\_rules.html](http://www.uncitral.org/uncitral/en/uncitral_texts/transport_goods/2008rotterdam_rules.html)

Rotterdam Rules Gain Momentum as 20th State Signs

<http://www.unis.unvienna.org/unis/pressrels/2009/unisl133.html>

The Rotterdam Rules. Wide Support by States at Signing Ceremony in Rotterdam

[https://www.bimco.org/Corporate%20Area/About/Press/Press\\_Releases/2009\\_09\\_23%20The%20Rotterdam%20Rules.aspx](https://www.bimco.org/Corporate%20Area/About/Press/Press_Releases/2009_09_23%20The%20Rotterdam%20Rules.aspx)

**Item 2. East Africa to Increase Environmental Security**

The East African Community (EAC) conference, ‘Peace and Security for Stability and Development,’ held in Kampala, Uganda, October 5–7, 2009 explored the issues and impacts of globalization and climatic change on the region. It recommended the creation of a regional standby force that would provide collective protection of EAC’s natural resources (land and marine), as well as the unified airspace. It would have active and reserve contingents, and would be different from the Brigades established by the African Union. The Implementation Plan for the EAC Regional Strategy for Peace and Security addresses broad human security concerns, including population growth, socio-political and economic security issues, and global warming. Along the same lines, the Annual Regional Parliamentary Forum on Environmental Security in Eastern Africa, held October 13–14, also in Uganda, discussed security implications of environmental challenges facing Africa, as well as environmental crime and its trans-boundary manageability. The recommendations to parliamentarians include initiating policy reforms and legislation, as well as establishing monitoring systems for environmental security related issues.

**Military Implications:**

If not already in process, AFRICOM and other relevant military sections should engage and seek collaboration with EAC and offer assistance with the Implementation Plan for the EAC Regional Strategy for Peace and Security. This is also an opportunity to apply the Army Strategy for the Environment.

**Sources:**

EAC Peace and Security Conference. Conference Resolutions and Recommendations

<http://www.eac.int/component/content/315.html?task=view>

Regional MPs Advocate for Climatic Change Mitigation

<http://allafrica.com/stories/200910160024.html>

Annual Regional Parliamentary Forum on Environmental Security in Eastern Africa 13 and 14 October 2009

[http://www.amaniforum.org/images/09\\_updates/Update%20on%20Environemtnal%20Security%20Forum.pdf](http://www.amaniforum.org/images/09_updates/Update%20on%20Environemtnal%20Security%20Forum.pdf)

**Item 3. Changes to Chemicals Regulatory Systems****3.1 Asian Countries to Adapt their Chemicals Regulatory Systems to EU REACH System**

China, Japan, and Korea have set the broad framework for adapting their chemicals regulatory systems to the EU REACH (Registration, Evaluation, Authorization and Restriction of Chemical substances) system. So far, they have only introduced REACH in the top legal structure, but during 2009–2010, their governments will issue additional regulations on issues such as chemical exposure, risk assessment, classification of chemicals, and collection of hazard data. Venues used for policy coordination include: the Tripartite Environmental Ministers Meeting; the Chemical Dialogue; the UN Strategic Approach to International Chemical Management, and the Globally Harmonized System on Classification and Labeling of Chemicals. The “REACHing Asia Continued” report examines the differences between the Asian chemicals regulatory system (specifically China, Japan and Korea) and the EU REACH system and outlines national frameworks covering, *inter alia*: pollutant release and transfer register; import and export restrictions; occupational exposure limits and protection; and chemical restrictions in products/compositions.

**Military implications:**

Military personnel in the region with environmental responsibilities should review these policy changes, update the database of restricted and banned chemicals, and actively seek environmentally safer substitutes. It is fair to speculate that the three Asian countries’ alignment with the REACH system will be emulated by other countries and regions around the world.

**Source:**

Park, DaeYoung: REACHing Asia Continued (September 16, 2009)

[http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1474504](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1474504)

**3.2 U.S. to Revise the Toxic Substances Control Act**

The overhaul of the U.S. 1976 Toxic Substances Control Act (TSCA) will require prioritizing tens of thousands of chemicals currently on the market. While there is agreement that the focus should be on the highest-priority chemicals based on potential health risks, the industry prefers using existing data, while environmentalists call for a risk-based standard focused on chemical regulation rather than product regulation.

**Military implications:**

Personnel with environmental and safety responsibilities should monitor this debate and anticipate how it might affect the prioritization and changes to the list of toxic and regulated substances; and hence, new requirements to seek substitutes for these chemicals.

**Sources:**

Experts debate ways to reform 1976 toxics law

<http://www.nytimes.com/gwire/2009/10/07/07greenwire-experts-debate-ways-to-reform-1976-toxics-law-83495.html>

Revisiting the Toxic Substances Control Act of 1976

<http://www.nanotechproject.org/news/archive/7092/>

Summary of the Toxic Substances Control Act

<http://www.epa.gov/lawsregs/laws/tsca.html>

#### **Item 4. EU to Introduce New Environmental Index**

In order to better measure progress, the EU Commission plans to develop a comprehensive index of environmental sustainability, which would include indicators on the main environmental policy and protection aspects. The index would complement the Gross Domestic Product (GDP), thus helping sustainable development policies. A pilot version of the index will be presented in 2010. The European Statistical System will also implement Environmental Accounting as a standard in macro-economic statistics, while the Commission will speed up environmental and social data generation for producing near real-time information for decision-making.

**Military Implications:**

Those involved with improving the military's role in environmental sustainability should contact the European personnel working on the environmental sustainability index to explore applications for a military environmental sustainability index. The new index of environmental sustainability could be an indicator for enforcement of current, and creation of new, environmental regulations.

**Sources:**

Environment: Measuring progress in a changing world

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1286>

Brussels wants wider measure of well-being than mere GDP

<http://news.my.msn.com/business/article.aspx?cp-documentid=3559371>

#### **Item 5. Technological Advances with Environmental Security Implications**

##### **5.1 New Detection and Cleanup Techniques**

###### **5.1.1 Multi-component Environmental Sensing System Could Help Anticipate Crises**

Prof. Eyal Ben-Dor of Tel Aviv University's Department of Geography has recently described applications of his team's 'Hyperspectral Remote Sensor' concept, which combines ground-, air-, and space-based physical, chemical and optical sensors to provide advance warnings of disasters or post-event damage assessments.

**Military Implications:**

The military should investigate this development to see if it could improve elements of its own environmental assessment and anticipation systems.

**Source:**

Sensing disasters from space

<http://www.physorg.com/news175441355.html>

**5.1.2 Scanning Instrument for Chemical Agents Detection**

Researchers at Queen's University in Belfast, Northern Ireland, are developing a new sensor that has the potential to detect chemical agents within seconds. The system consists of special gel pads to collect samples from people or objects, and a scanning device (using Raman spectroscopy). Mixing the samples with nanoscale silver particles amplifies the signals of compounds, allowing detection of even very small traces of chemical agents.

**Military implications:**

Relevant military personnel might consider the new scanning technology for potential application in detecting harmful chemicals.

**Sources:**

Chemical sensor to fight terrorism

[http://latestnews.virginmedia.com/news/tech/2009/10/05/chemical\\_sensor\\_to\\_fight\\_terrorism](http://latestnews.virginmedia.com/news/tech/2009/10/05/chemical_sensor_to_fight_terrorism)

Ulster scientists develop sensors for chemical agents

<http://kn.theiet.org/news/sep09/ulster-chem-sensors.cfm>

**5.1.3 Ultrasensitive Sensor Could Detect Bacteria in Minutes**

According to an article in MIT's Technology Review, a new sensor developed by Benjamin Miller, professor of dermatology and biomedical engineering at the University of Rochester Medical Center, and associates, could be the basis for a portable instrument that could detect bacteria in the environment in 15 minutes to two hours. The sensor is based on a folded strand of complementary DNA that unfolds upon bonding with a sensed target sequence, allowing a fluorescent molecule attached to one end of the DNA to glow. Lighthouse Biosciences in West Henrietta, New York is commercializing the technology. Other similar efforts at Northwestern University (used in a product by Nanosphere of Northbrook IL) and MIT are also briefly cited in the article.

**Military Implications:**

The military should follow these developments as possibly providing components for environmental surveillance and evaluation systems.

**Source:**

Ultrafast DNA Nanosensor. A new type of sensor makes diagnosing infections quick and easy

<http://www.technologyreview.com/biomedicine/23575/>

**5.1.4 New Method for Assessment of Fine Dust Composition**

A project managed by Dr. Cord Fricke-Begemann at the Fraunhofer Institute for Laser Technology in Aachen, Germany, has developed a new technique for analyzing by particle size the components of fine dust (< 100 nm) such as may be generated by industrial processes. According to a story in Nanowerk News, "a gas stream separates the particles into size classes before they are collected on filters. Their composition is then examined by means of laser emission spectroscopy." Results can be obtained in less than 20 minutes.

**Military Implications:**

The military should investigate this technique for use in environmental assessment. It is of special significance considering Item 5.7.3 *New Paper Suggests Concentrating Toxicity Studies on Smaller Nanoparticles* from the September 2009 issue of this report.

**Source:**

Tracing ultra-fine dust

<http://www.nanowerk.com/news/newsid=12864.php#>

**5.2 Increasing Energy Efficiency Technologies****5.2.1 Algae Provide Material for New Thin and Flexible Battery**

Scientists at the Ångström Laboratory at Uppsala University, Sweden, have developed a new type of battery, using algae-derived polypyrrole-coated cellulose for electrodes, separated by saline-soaked filter paper, yielding a product which, although less powerful than conventional units, is light-weight, inexpensive, and environmentally friendly to produce.

**Military Implications:**

The military should follow this development for its potential use in very light, portable environmental sensing systems.

**Sources:**

Super-thin batteries made from paper and algae

<http://www.rsc.org/chemistryworld/News/2009/September/15090902.asp>

Ultrafast All-Polymer Paper-Based Batteries

<http://pubs.acs.org/doi/abs/10.1021/nl901852h>

Salt and Paper Battery May One Day Replace Lithium Batteries

<http://www.physorg.com/news172241467.html>

**5.2.2 Changing Temperature Changes Roof Tiles from Black to White to Save Energy**

A group of recent MIT graduates have developed a material for roofing tiles that changes color from black to white as the temperature rises, reflecting the sun's heating rays, and thus saving on building cooling requirements and consequent energy demand, while still absorbing the radiation in cold weather. Nick Orf, a member of the Thermeleon team, says it is determined to pursue the project and develop it into a marketable product, but also notes that the material's cost and durability remain to be explored.

**Military Implications:**

The military should investigate the possible use of this technique in military installations to conserve energy.

**Source:**

Energy savings in black and white

<http://web.mit.edu/newsoffice/2009/madmec-roof.html>

**5.3 Progress Announced in Methane-to-Liquid Process Development**

Scientists at the departments of chemistry at the University of North Carolina at Chapel Hill and the University of Washington have announced the first observation of a metal complex (a compound consisting of a central metal atom connected to surrounding atoms or molecules) that



binds methane in solution. This is an important first step in the development of a process for converting methane to a more easily transported and stored and more environmentally friendly liquid fuel.

**Military Implications:**

Although this is only the beginning of a long development effort, the military should stay in touch with this approach to an alternative fuel source.

**Sources:**

New clues in quest for liquid methane

<http://futura.org/top-stories/new-clues-in-quest-for-liquid-methane/>

Characterization of a Rhodium(I) {sigma}-Methane Complex in Solution

<http://www.sciencemag.org/cgi/content/abstract/sci;326/5952/553>

**Item 6. Updates on Previously Identified Issues****6.1 Assessment and Potential Revision of Resolution 1540 on Preventing WMD Terrorism**

The UN Security Council's 1540 Committee conducted a three-day review meeting of Resolution 1540 (that requires states to take steps to prevent terrorists from acquiring chemical, biological, radiological and nuclear weapons) to assess the evolution of risks and threats, and to address implementation aspects. Issues identified include: lack of capacity-building tools and criteria for evaluation, geographical gaps, and compatibility differences of national systems, as well as potential weaknesses at the international level. Some delegates argued that the resolution did not have the same power and impact as a convention, therefore legislations are not 1540-specific, and cannot be used for prosecutions. The Committee hopes to prepare a report on collaborative anti-WMD strategies by the end of 2009, said panel head, Jorge Urbina, Costa Rican ambassador to the UN. [Related item: *Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction* in July-August 2008 environmental security report.]

**Military Implications:**

Considering the fast and complex development of WMD threats, and the lack of coordination and insufficient enforcement of the respective treaties (chemical, biological, and nuclear), it is likely that Resolution 1540 will evolve into a convention, with clear implementation, evaluation and enforcement stipulations. Relevant military personnel should collaborate as appropriate to strengthen and improve the implementation of the Resolution worldwide.

**Source:**

Risks to Non-proliferation Regime Challenge Resolution 1540 to Ensure States Enact Domestic Controls over Weapons of Mass Destruction Spread to Non-State Actors

<http://www.un.org/News/Press/docs//2009/sc9757.doc.htm>

**6.2 First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination**

As part of the UN's effort to improve coordination, reduce overlaps, and improve enforcement of multilateral environmental agreements, the first simultaneous extraordinary meetings of the Conferences of the Parties to the Basel (control of transboundary movement of hazardous waste), Rotterdam (prior informed consent for certain hazardous chemicals), and Stockholm (on POPs) Conventions, will be held February 22-26, 2010, in Bali, Indonesia, in coordination with the UNEP 11<sup>th</sup> Governing Council/Global Ministerial Environment Forum. The Synergies Oversight

Team, composed of the Executive Secretaries of the three Conventions and representatives of UNEP and FAO, is coordinating the preparation of the simultaneous ExCOPs, while also assessing synergies in a strategic and long-term perspective. In a preamble to the conference, UNEP and FAO have launched a website that presents updated information on the ExCOPs: <http://excops.unep.ch>. Incidentally, the Basel Convention Committee has recently released a practical guide on national reporting by parties to the Basel Convention. [Related item: *UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance* in February 2007 environmental security report.]

**Military Implications:**

It is likely that coordination and synergies identification among the three Conventions will lead to some new directives and better enforcement measures. The military and its contractors should follow the process in order to be prepared to comply with the new requirements in the nations Party to the treaties. Note: the U.S. is not Party, but signatory of all three Conventions.

**Source:**

Simultaneous Extraordinary Meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions

<http://excops.unep.ch/>

Basel Convention National reporting

<http://www.basel.int/natreporting/index.html> (direct link to the Guidance Document on Improving National Reporting by Parties to the Basel

Convention: <http://www.basel.int/natreporting/GuidFinal-22102009.doc>)

**6.3 Reducing GHG Emissions Using the Montreal Protocol and other Regulatory Systems**

Considering the need for “fast-action” to reduce greenhouse gas emissions and avoid abrupt climate changes, international ozone negotiators suggest the use of the Montreal Protocol and similar existent international regulations, by amending them to cover greenhouse gases, such as hydrofluorocarbons (HFCs), and black carbon particles and precursor gases. The subject is on the agenda of the 21<sup>st</sup> meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, to be held in Egypt, on November 4-8, 2009. Note: “fast-action” includes regulatory measures that can begin within 2–3 years, be substantially implemented in 5–10 years, and produce a climate response within decades. [Related item: *Regulations Might be Needed for New Greenhouse Gases* in April 2009 environmental security report.]

**Military Implications:**

This parallel strategy to the post-Kyoto Protocol approach could speed up the international regulatory response to climate change; hence, the military and its contractors should consider accelerating the work to phase out GHGs and find substitutes.

**Sources:**

Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO<sub>2</sub> emissions

<http://www.pnas.org/content/early/2009/10/19/0902568106.full.pdf+html>

Climate scientists suggest revisiting the 1987 Montreal Protocol

<http://www.canada.com/technology/Climate%20scientists%20suggest%20revisiting%201987%20Montreal%20Protocol/2103810/story.html>



Ozone protocol squares up to climate

<http://www.nature.com/news/2009/091028/full/4611184a.html>

#### **6.4 Belgian Senate to Consider Nuclear-Weapon Ban**

A bill submitted to the Belgian Senate on October 15, 2009, is proposing a ban in Belgium on the manufacturing, fixing, sale, shipping, and possession of nuclear arms. Deliberations will take at least until May 2010. Belgium has already banned cluster and depleted uranium munitions.

[Related item: *UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty* in September 2009 environmental security report.]

##### **Military Implications:**

This is one more indicator of the growing interest in banning nuclear weapons and the long-range need for new forms of deterrence.

##### **Sources:**

Belgian Senate to Consider Nuclear-Weapon Ban

[http://gsn.nti.org/gsn/nw\\_20091016\\_3998.php](http://gsn.nti.org/gsn/nw_20091016_3998.php)

Bill to ban nuclear weapons reaches Belgian Senate

[http://www.breitbart.com/article.php?id=D9BBIE780&show\\_article=1](http://www.breitbart.com/article.php?id=D9BBIE780&show_article=1)

Belgian initiative to ban nuclear weapons

<http://groups.yahoo.com/group/NucNews/message/30249>

#### **6.5 EU Potential New Measures For Reducing CO<sub>2</sub> Emissions**

Following discussions of EU finance ministers concerning a carbon tax across the bloc to further reduce CO<sub>2</sub> emissions and fight climate change, the European Commission will probably make the formal proposal next year. Several EU member states already have such a tax, but a bloc-wide deal might be difficult, since taxation is a matter of national sovereignty and any change requires unanimity among the 27 member states.

To further reduce emissions from transportation vehicles, the European Commission proposed emissions limits for light trucks and vans (minibuses to be exempted). The proposal restricts light trucks and vans CO<sub>2</sub> emissions to 175 grams/kilometer driven (present EU average is around 200 grams.) This limit will be introduced gradually from 2014 to 2016, while by 2020 van makers would have to meet a 135 grams target or face fines. The draft legislation moves now to negotiations at the European Parliament and EU governments. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.]

##### **Military Implications:**

Military stationed in EU member states should enhance their efforts to support EU CO<sub>2</sub> emissions reduction policy and seek opportunities to apply the Army Strategy for the Environment.

##### **Sources:**

EU mulls carbon tax to fight climate change

<http://english.cctv.com/20091003/102119.shtml>

Commission unveils van CO<sub>2</sub> emissions standards proposal

<http://euobserver.com/9/28904/?rk=1>

Europe Suggests Emissions Limits on Small Trucks

[http://www.nytimes.com/2009/10/29/business/energy-environment/29vans.html?\\_r=1](http://www.nytimes.com/2009/10/29/business/energy-environment/29vans.html?_r=1)

## 6.6 Russia to Boost Its Space Security Program

Reportedly, participants in the Russian State Duma hearings on planetary security stated that it was time for Russia to supplement its national space program with the study of the asteroid hazard and possible ways to protect the Earth. [In March 2009 an asteroid missed Earth by 77,000 kilometers, 80% closer to the planet than our moon is. If it had hit Earth, it would have wiped out all life on 800 square kilometers. No one knew it was coming.] Asteroid-comet hazard and international legal aspects of counteracting the impact hazard were also on the agenda of the ‘Asteroid-Comet Hazard-2009’ conference held September 21-25, 2009, in St. Petersburg (proceedings to be available on November 6). NASA already has a Near-Earth Object Program Office, and Italy and Spain cooperate on NEODYS (Near Earth Objects Dynamic Site). Meantime, Roscosmos (the Russian Federal Space Agency) announced plans to design by 2012 a nuclear-powered spacecraft, to be ready for a manned mission after 2021. [Related items: *Steps for an International Regime for Space Debris and Space Traffic Control System* in May 2009 environmental security report.]

### **Military Implications:**

[Similar to previous on this issue] In addition to the DOD’s Commercial and Foreign Entities program, the military should increase cooperation with military counterparts and civilian organizations around the world to explore joint research programs and design of a legal framework to increase space security.

### **Sources:**

Russia Needs To Add Asteroid Hazard Study To National Space Program – Opinion (ITAR-TASS, Moscow, October 6; article not available any more; see text in the [Appendix](#))  
International conference Asteroid-Comet Hazard – 2009  
[http://www.ipa.nw.ru/conference/ach2009/first\\_announcement.php?lang=en](http://www.ipa.nw.ru/conference/ach2009/first_announcement.php?lang=en)  
Russia develops design for spaceship with nuclear engine  
<http://en.rian.ru/science/20091028/156623290.html>  
Asteroid Apophis less likely to collide with Earth  
<http://www.itwire.com/content/view/28361/1066/>

## 6.7 EPA Warnings on Various Potential Health Hazards

The Environmental Protection Agency has issued a final Federal Register notice designating 31 areas throughout the U.S. as “nonattainment” and “unclassifiable/attainment” for the 24-hour national air quality standards for fine particulate matter, also called PM2.5. These communities will have to formulate plans for reducing fine particle pollution.

Another EPA announcement warns that high levels of PCBs can readily occur in the caulking material used in buildings built or renovated from 1950 to 1978, and that there is a continuing risk to personnel from exposure to PCBs in the material around doors and windows, and in the joints between masonry products such as brick or concrete block.

### **Military Implications:**

Military installations in potentially affected areas or buildings should be prepared to work with the local communities for meeting health standards.

### **Sources:**

EPA Lists Areas Violating Daily Air Pollution Requirements 31 locations not meeting 24-hour fine particle standards

<http://yosemite.epa.gov/opa/admpress.nsf/6424ac1caa800aab85257359003f5337/ee3e8db020a8b8ed85257649005b266c!OpenDocument>

EPA Designates Areas as Attainment and Nonattainment for the 24-Hour PM<sub>2.5</sub> National Air Quality Standards

<http://www.epa.gov/pmdesignations/2006standards/regs.htm#4>

PCBs in Caulk in Older Buildings

<http://www.epa.gov/pcbsincaulk>

## **6.8 Climate Change**

### 6.8.1 Scientific Evidence and Natural Disasters

Scientists found that Arctic Ocean waters are acidifying at an unprecedented rate, as more CO<sub>2</sub> can dissolve in cold water than warm. Research carried out in the archipelago of Svalbard revealed that seawater could reach corrosive levels within 10 years, thus jeopardizing shellfish and other life forms and livelihoods depending on it. At this rate, scientists fear that 10% of the Arctic Ocean will be corrosively acidic by 2018; 50% by 2050; and entirely by the end of the century.

### 6.8.2 Food and Water Security

The number of hungry people in the world rose to 1.02 billion this year. Varying impacts of climate change (including lower water availability, and an increase in plant and animal pests and diseases) could lead to a 30% reduction in agricultural productivity output in Africa and a 21% reduction in Asia, noted FAO Director-General Jacques Diouf, at the two-day high-level forum “How to Feed the World in 2050,” held October 12-13. About 300 experts attending the forum, debated policy, technology, and investment needs to achieve food security by 2050. FAO estimates that in order to ensure food security for over 9 billion people in 2050, investments in agriculture in developing countries should increase by about 50%, to \$83 billion a year (\$29 billion for India and China). Noting the challenge of feeding another 2.3 billion people by 2050 while at the same time limiting the environmental impact of the farm sector, the report *Reaping the benefits: Science and the sustainable intensification of global agriculture* by the Royal Society is calling for a £2 billion “Grand Challenge” research program on global food security including investment in genetically modified crops. The *Climate Change: Impact on Agriculture and Costs of Adaptation* report by the International Food Policy Research Institute, examining the impact of climate change on food security compared to a no-climate-change scenario, forecasts that in 2050 there will be a 90% increase in wheat prices, in the developing world calorie availability will decline relative to 2000 levels, and there will be an additional 25 million malnourished children.

The *Africa Factbook 2009* by the Global Footprint Network warns that if current population and consumption trends continue, Africa’s Ecological Footprint will exceed its biocapacity within the next 20 years, with some countries, including Senegal, Kenya, and Tanzania, potentially reaching that threshold in less than five years. It notes that between 1961 and 2005, while Africa’s population grew from 287 million to 902 million people, the amount of biocapacity (food, fiber and timber resources that are renewably available) per person decreased by 67%. A World Summit on Food Security will be held at FAO headquarters in Rome, November 16-18, 2009.

In India, the four-month monsoon season ended with rains 23% below normal, causing the country's worst drought since 1972. Food prices already skyrocketed and threaten inflation. About half of India's 1.2 billion people depend on agriculture for their income.

The Water Governance Programme for Arab States was officially launched by the UNDP Regional Bureau for Arab States and the League of Arab States at the high-level Partners Meeting on Water Governance, on October 12, 2009. The Programme aims to support water management in the Arab States by integrating socio-economic and environmental dimensions. Meantime, Egyptian officials warn that the Nile Delta region is facing a double threat, due to freshwater needs which might surpass resources by 2017, and rising sea levels inundating much of the fertile Delta region, where 60% of the country's 78 million people live. Over the past decade, the Mediterranean is been rising an average of 2 centimeters annually, says Mohamed al-Raey of Alexandria University. A one-meter sea-level rise would submerge Alexandria. Meantime, Egypt is facing disputes with the other ten Nile basin countries that are demanding bigger shares of Nile water to compensate for reduced rainfall.

### 6.8.3 Health

*Health Problems Heat Up: Climate Change and the Public's Health* by the Trust for America's Health warns that climate change will make Americans more vulnerable to diseases, disasters, and heat waves. According to the report, only five states have published a strategic climate change plan that includes a public health response, including planning for health challenges and emergencies expected to develop from natural disasters, pollution, and infectious diseases as temperatures and sea levels rise. The report includes several recommendations related to setting national guidelines and measures for core public health functions and funding for climate change planning and response, and special efforts to address the impact of climate change on at-risk and vulnerable communities.

### 6.8.4 Melting Glaciers and Sea Ice

Losses from both Greenland and Antarctica have accelerated over the past seven years, shows a comprehensive continuous monitoring of the ice sheets using the Gravity Recovery and Climate Experiment (GRACE) satellite mission, which 'weighs' the ice on a monthly basis. NASA geophysicist Isabella Velicogna says that "That is a big thing," and "We should be more concerned." Similarly, based on recent field observation, David Barber, Canada's Research Chair in Arctic System Science at the University of Manitoba, notes that the multiyear ice covering the Arctic Ocean is almost gone.

### 6.8.5 Migration

UNDP's Human Development Report 2009, *Overcoming barriers: Human mobility and development*, focuses on different forms of migration. The report indicates that out of about 1 billion migrants worldwide, 740 million are intrastate, and only about a third of the transnational migrants move from a developing country to a developed one. The report notes that climate change-induced displacement is very difficult to estimate, due to many uncertain variables, and comments that estimates of 200 million to 1 billion migrants by 2050 do not take into account the adaptation and mitigation measures, while environment-related migration is directly dependent on livelihood opportunities and public policy responses combined.

The UN Special Rapporteur on adequate housing, Raquel Rolnik, reiterated the need for some legal framework for environmental refugees, to ensure that people affected by climate change are treated with dignity, offered appropriate housing and livelihoods, and social organizations of those affected are protected.

#### 6.8.6 Adaptation

The Consultative Meeting of Parliamentarians from Central Africa, held October 17 in Chad, recognized the synergies between disaster risk reduction and adaptation, and concluded that disaster risk reduction measures should be a main adaptation tool to the effects of climate change that are already affecting many African countries. The Chair of the African Parliamentary initiative on Climate Risk Reduction called for a common African position that would link climate change adaptation to disaster risk reduction. Participants to the Southern African Development Community annual emergency preparedness and response workshop held in Johannesburg, South Africa, also pledged to strengthen their ability to respond to natural disasters and reduce risks on their populations. The SADC Secretariat will set up a regional disaster risk reduction unit that will provide leadership and coordination for early warning and disaster risk reduction to SADC member States. At the World Forum on Sustainable Development held October 9-11, 2009, in Ouagadougou, Burkina Faso, under the theme “Climate Change: What Opportunities for Sustainable Development?” African leaders emphasized that climate change adaptation policies and development strategies in the region should be integrated. They also called for the acceleration of the creation of a department for African environmental programs at the African Bank of Development, with a special fund to be contributed mainly by the developed countries. It was also decided that Africa speaks with one voice at the Copenhagen climate summit, including the demand for a compensation to be paid by major polluters, estimated at \$65 billion dollars.

*Managing our coastal zone in a changing climate: the time to act is now*, a report by the Australian House of Representatives Climate Change, Water, Environment and the Arts Committee, is a comprehensive analysis of the impact of climate change on Australia. The report highlights the importance of the issue since 80% of Australia’s population lives in the coastal zone. It recommends new coastal management measures, based on national leadership in a collaborative framework with state and local governments and communities.

#### 6.8.7 Scenarios

The World Wide Fund for Nature (WWF) report *Climate Solutions II* warns that the world has only five years to switch to low-carbon reindustrialization and avoid the point of no return estimated to be in 2014. The report considers two scenarios of emission cuts by 2050 relative to 1990 levels: one of 63% cuts, and another of 80%. It finds that clean, low-carbon industries would need to grow at least 22% a year for the 63% reduction scenario to be achieved, and at least 24% a year for the 80% reduction scenario to be achieved. According to the report, the estimated short-term investment to achieve these goals is between \$7 trillion and \$17 trillion.

#### 6.8.8 Post-Kyoto Negotiations

The deadlock in negotiations for a UN climate treaty continues. The Bangkok talks (held September 28 to October 9, 2009) ended with deep divisions between developing and developed countries and the length of the text still to be processed remains considerable. “Satisfactory”

progress is reported as being achieved on issues such as adaptation, technology, and capacity building. The negotiations will resume in Barcelona, November 2-7, which should produce a report to the 15th Conference of the Parties (COP 15) to be held in Copenhagen, Denmark, December 7-18, 2009. Many speculate that a legally binding document is unlikely to be agreed upon in December, and a new deadline might be set in 2010.

Meantime, regional and national efforts continue. Europe offers to cut its greenhouse gas emissions by up to 95% by 2050 and by 30% by 2020 if a deal is reached at Copenhagen. The U.S. Senate Environment and Public Works Committee is advancing on climate-change legislation, to be submitted at the beginning of November, that aims to reduce 2005-level greenhouse gases emissions of U.S. industry by 20% by 2020.

### **Military Implications:**

[Same as previous on this issue] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

**Sources:** (see a more expanded list in the [Appendix](#))

Arctic seas turn to acid, putting vital food chain at risk

<http://www.guardian.co.uk/world/2009/oct/04/arctic-seas-turn-to-acid>

How to feed the world 2050 (12-13 Oct)

<http://www.fao.org/wsfs/forum2050/wsfs-forum/en/>

*Footprint Factbook | Africa 2009. Securing human development in a resource constrained world*

[http://www.footprintnetwork.org/images/uploads/AfricaFactbook\\_2009.pdf](http://www.footprintnetwork.org/images/uploads/AfricaFactbook_2009.pdf)

UNDP launches its "Water Governance Programme for Arab States"

<http://content.undp.org/go/newsroom/2009/october/undp-launches-its-water-governance-programme-for-arab-states.en>

EGYPT: Disaster looms for Delta region

<http://www.irinnews.org/Report.aspx?ReportId=86472>

Health Problems Heat Up: Climate Change and the Public's Health

<http://healthyamericans.org/reports/environment>

Both of the World's Ice Sheets May Be Shrinking Faster and Faster

[http://www.democraticunderground.com/discuss/duboard.php?az=view\\_all&address=115x213048](http://www.democraticunderground.com/discuss/duboard.php?az=view_all&address=115x213048)

UNDP Human Development report 2009

<http://hdr.undp.org/en/reports/global/hdr2009/>

African Parliamentarians agree on concrete actions to reduce the impact of climatic disasters

<http://www.unisdr.org/news/v.php?id=11479>

World 'Has Five Years' to Stop Climate Change

<http://allafrica.com/stories/200910190109.html>

Summary of the Bangkok Climate Change Talks: 28 September - 9 October 2009

<http://www.iisd.ca/download/pdf/enb12439e.pdf>

Europe offers to cut emissions 95% by 2050 if deal reached at Copenhagen

<http://www.guardian.co.uk/environment/2009/oct/21/europe-carbon-emissions>

Sen. Boxer to move ahead on climate bill

<http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE59Q0JY20091029>



## 6.9 Nanotechnology Safety Issues

More detailed descriptions of the following nanotechnology issues are in the [Appendix](#)

- EPA several years research plan on the health and environmental risks from manufactured nanomaterials and on nanotech-based cleanup techniques ([more](#))
- European Commission to review nanotech-related policies ([more](#))
- *Nanotechnologies in the 21<sup>st</sup> Century - A Critical Review of Governance Issues in Europe and Elsewhere* report ([more](#))
- EC's DEEPEN Final Report on Nanotech Development Ethics Released ([more](#))
- European Commission (DG Health and Consumers) Scientific Hearing presentations ([more](#))
- North Carolina Summit Focus on Environmentally Responsible Development of Nanotech ([more](#))
- Current Nanotech Protective Gear May Not Be Adequate, Suggests a Report ([more](#))
- French Public Debate on Nanotechnology ([more](#))
- European Project to Study Metal Oxide Nanoparticle Risks ([more](#))
- Norwegian Research Group Launches Nanotech Particles Project ([more](#))
- New Nanotech Survey Book Covers Environmental Aspects ([more](#))

## Item 7. Reports and Information Suggested for Review

### 7.1 *Reconsidering the Rules for Space Security*

*Reconsidering the Rules for Space Security* by Nancy Gallagher and John D. Steinbruner reviews the current regulations that currently govern the use of space and the relevancy of the 1967 Outer Space Treaty. It argues that the U.S. should advance international negotiations based on the Treaty for developing new rules that explicitly address problems of space security, to specifically outlaw weaponization of space, and define the legitimate limits of space-based support for military missions. Some practical recommendations for successful negotiations include strategies for equitable distribution of the costs of compliance systems.

#### **Military Implications:**

There is increasing agreement that the Outer Space treaty should be updated in view of current and future challenges concerning space security. This book is a source of information for those efforts.

#### **Source:**

Reconsidering the Rules for Space Security

<http://www.amacad.org/publications/reconsidering.aspx>

### 7.2 U.S. Should Launch a New Biology Initiative

*A New Biology for the 21<sup>st</sup> Century: Ensuring the United States Leads the Coming Biology Revolution*, a report from the National Research Council, assessing the state of use of recent advances in biology, concludes that the design, manipulation, and prediction of complex biological systems needed for practical applications are “well beyond current capabilities.” To accelerate the implementation process, the report recommends a National New Biology Initiative, with an interagency and interdisciplinary approach and a timeline of at least ten years and funding in addition to current research budgets. The report underlines that the initiative could also be used to address environmental issues by making it possible to monitor ecosystems and diagnose and repair ecosystem damage.

**Military Implications:**

The military should consider the report's outcomes and seek support and collaboration for a National New Biology Initiative in the spirit of reducing the military environmental footprint.

**Source:**

National New Biology Initiative Offers Potential For 'Remarkable and Far-reaching Benefits'  
<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12764>

**7.3 London Conference to Include Hazard Detection Technologies**

The Institute of Nanotechnology is holding a conference, Converging Technologies for 21st Century Security, on 25 November 2009 at the Royal College of Physicians, London. The meeting will include a session, 'Hazardous Material Detection,' and a paper, 'Use of Antibody-based Approaches for the Detection of Hazardous Materials.'

**Military Implications:**

Appropriate military personnel should consider attending this conference for potential new information about environmental assessment techniques.

**Source:**

Converging Technologies for 21st Century Security  
<http://www.nanoforum.org/nf06~modul~showmore~folder~99999~scc~news~scid~4016~.html?action=longview&>

## APPENDIX

### Reference Details

This Appendix contains expanded background information on some items.

### 6.8 Climate Change

An expanded list of sources:

#### 6.8.1 Scientific Evidence and Natural Disasters

Arctic seas turn to acid, putting vital food chain at risk

<http://www.guardian.co.uk/world/2009/oct/04/arctic-seas-turn-to-acid>

#### 6.8.2 Food and Water Security

Hike in agricultural investment needed to feed world's surging population – UN

<http://www.un.org/apps/news/story.asp?NewsID=32459&Cr=fao&Cr1=>

FAO High-Level Forum Highlights Impacts of Climate Change on Agriculture

<http://climate-l.org/2009/10/14/fao-high-level-forum-highlights-impacts-of-climate-change-on-agriculture/>

World Summit on Food Security

<http://www.fao.org/wsfs/world-summit/en/>

How to feed the world 2050 (12-13 Oct)

<http://www.fao.org/wsfs/forum2050/wsfs-forum/en/>

Agriculture to 2050 – the challenges ahead

<http://www.fao.org/news/story/en/item/36193/icode/>

Committee on World Food Security 35th Session (14-17 Oct)

[http://www.fao.org/UNFAO/Bodies/cfs/cfs35/index\\_en.htm](http://www.fao.org/UNFAO/Bodies/cfs/cfs35/index_en.htm)

FAO World Food Day (16 Oct)

<http://www.fao.org/getinvolved/worldfoodday/en/>

Experts Worry as Population and Hunger Grow

[http://www.nytimes.com/2009/10/22/world/22food.html?\\_r=2](http://www.nytimes.com/2009/10/22/world/22food.html?_r=2)

Feeding the world

[http://www.economist.com/daily/news/displaystory.cfm?story\\_id=14636492&fsrc=nwl](http://www.economist.com/daily/news/displaystory.cfm?story_id=14636492&fsrc=nwl)

Reaping the benefits: Science and the sustainable intensification of global agriculture

<http://royalsociety.org/document.asp?tip=0&id=8825>

World must use GM crops, says UK science academy:

<http://www.reuters.com/article/environmentNews/idUSTRE59K0AT20091021>

Climate change: Impact on agriculture and costs of adaptation

<http://www.ifpri.org/publication/climate-change-1>

Ecological Trends and Africa's Future: New report examines risks, opportunities

[http://www.footprintnetwork.org/en/index.php/GFN/press/africas\\_demand\\_on\\_nature\\_approaching\\_critical\\_limits\\_report\\_finds/](http://www.footprintnetwork.org/en/index.php/GFN/press/africas_demand_on_nature_approaching_critical_limits_report_finds/)

*Footprint Factbook | Africa 2009. Securing human development in a resource constrained world*

[http://www.footprintnetwork.org/images/uploads/AfricaFactbook\\_2009.pdf](http://www.footprintnetwork.org/images/uploads/AfricaFactbook_2009.pdf)

Wall Street Journal: India's drought is worst since 1972

<http://online.wsj.com/article/SB125435762124654633.html>

UNDP launches its "Water Governance Programme for Arab States"

<http://content.undp.org/go/newsroom/2009/october/undp-launches-its-water-governance-programme-for-arab-states.en>

EGYPT: Disaster looms for Delta region

<http://www.irinnews.org/Report.aspx?ReportId=86472>

### 6.8.3 Health

Health Problems Heat Up: Climate Change and the Public's Health

<http://healthyamericans.org/reports/environment>

Ailing planet seen as bad for human health

<http://www.washingtonpost.com/wp-dyn/content/article/2009/10/26/AR2009102602402.html?hpid=topnews>

### 6.8.4 Melting Glaciers and Sea Ice

Both of the World's Ice Sheets May Be Shrinking Faster and Faster

[http://www.democraticunderground.com/discuss/duboard.php?az=view\\_all&address=115x213048](http://www.democraticunderground.com/discuss/duboard.php?az=view_all&address=115x213048)

Multiyear Arctic Ice Is Effectively Gone: Expert

<http://planetark.org/wen/55254>

### 6.8.5 Migration

UNDP Human Development report 2009

<http://hdr.undp.org/en/reports/global/hdr2009/>

Climate change talks must include focus on adequate housing, says UN expert

<http://www.un.org/apps/news/story.asp?NewsID=32695&Cr=climate+change&Cr1=>

### 6.8.6 Adaptation

African Parliamentarians agree on concrete actions to reduce the impact of climatic disasters

<http://www.unisdr.org/news/v.php?id=11479>

SADC commits to disaster risk reduction

<http://www.newera.com.na/article.php?articleid=7479>

Africa demands reparation for ills committed by major polluters

[http://news.xinhuanet.com/english/2009-10/13/content\\_12225422.htm](http://news.xinhuanet.com/english/2009-10/13/content_12225422.htm)

7th World Forum on Sustainable Development

[http://www.fmdd.fr/english\\_version.html](http://www.fmdd.fr/english_version.html)

Africa comes together in Burkina to talk about climate change

<http://content.undp.org/go/newsroom/2009/october/lafrigue-runie-au-burkina-sur-le-thme-des-changements-climatiques-.en>

Managing our coastal zone in a changing climate The time to act is now House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts

<http://www.aph.gov.au/House/committee/ccwea/coastalzone/report.htm>

Exotic disease risk rises

<http://www.smh.com.au/environment/exotic-disease-risk-rises-20091026-hgrj.html>

#### 6.8.7 Scenarios

World 'Has Five Years' to Stop Climate Change

<http://allafrica.com/stories/200910190109.html>

#### 6.8.8 Post-Kyoto Negotiations

Summary of the Bangkok Climate Change Talks: 28 September - 9 October 2009

<http://www.iisd.ca/download/pdf/enb12439e.pdf>

UN climate talks split on treaty

<http://news.bbc.co.uk/2/hi/science/nature/8298553.stm>

Documentation to facilitate negotiations amongst Parties: Note by the Chair

<http://climate-l.org/2009/10/26/unfccc-secretariat-releases-awg-kp-documentation-to-facilitate-negotiations/>

Backers of UN climate treaty look to 2010 for deal

<http://www.reuters.com/article/environmentNews/idUSTRE59Q2TG20091027>

Europe offers to cut emissions 95% by 2050 if deal reached at Copenhagen

<http://www.guardian.co.uk/environment/2009/oct/21/europe-carbon-emissions>

Sen. Boxer to move ahead on climate bill

<http://www.reuters.com/article/GCA-GreenBusiness/idUSTRE59Q0JY20091029>

Africans demand voice in climate change meeting

<http://www.businessdailyafrica.com/Company%20Industry/-/539550/673832/-/view/printVersion/-/12pxh56z/-/index.html>

African countries will speak with one voice at Copenhagen climate summit: AU chief

[http://news.xinhuanet.com/english/2009-10/12/content\\_12218664.htm](http://news.xinhuanet.com/english/2009-10/12/content_12218664.htm)

### **6.9 Nanotechnology Safety Issues**

More detailed descriptions of the nanotechnology issues

#### 6.9.1 EPA Unveils Nanotech Risk Research Plan

The Environmental Protection Agency has announced a new research strategy for the next several years for work on the health and environmental risks from manufactured nanomaterials and on nanotech-based cleanup techniques.

#### **Military Implications:**

Military personnel concerned with nanotech risks and applications should review this document for its comprehensive presentation (49 pp) of the issues and research approaches in the field.

#### **Sources:**

Nanomaterial Research Strategy. Office of Research and Development U.S. EPA

Report: [http://www.epa.gov/nanoscience/files/nanotech\\_research\\_strategy\\_final.pdf](http://www.epa.gov/nanoscience/files/nanotech_research_strategy_final.pdf)

EPA announces research strategy to study nanomaterials

<http://www.nanowerk.com/news/newsid=12839.php#>

#### 6.9.2 European Commission to Review Nanomaterial Policies

Responding to a request from the European Parliament, the European Commission plans to "review all relevant legislation within two years to ensure safety for all applications of

nanomaterials in products with potential health, environmental or safety impacts over their life cycle," according to EU Environment Commissioner Stavros Dimas.

**Military Implications:**

[Similar to others on this issue] Military personnel concerned with nanotech environmental risks should keep in touch with EU agencies' activities in carrying out this review and implementing any resultant regulatory measures.

**Source:**

EU plans to review its policies on nanomaterials  
<http://www.nanowerk.com/news/newsid=13104.php>

6.9.3 European Environmental Bureau Assessment of Nanotech Governance Issues

According to Nanowerk, the European Environmental Bureau has issued a report, *Nanotechnologies in the 21<sup>st</sup> Century - A Critical Review of Governance Issues in Europe and Elsewhere* (October 09), outlining the critical governance structures needed for the safe development and use of nanotechnology. The report "reviews the current uncertainties associated with the governance of nanotechnologies ... [and] presents NGO initiatives for nano regulation calling for the application of the precautionary principle and pre-market registration of materials."

**Military Implications:**

[Similar to others on this issue] Military personnel concerned with nanotech environmental risks should consider the document as input for assessed governance gaps and eventual regional/international regulations.

**Sources:**

*Nanotechnologies in the 21<sup>st</sup> Century - A Critical Review of Governance Issues in Europe and Elsewhere* Report  
<http://www.eeb.org/publication/2009/2009-NanoBrochureNo3-WEB.pdf>  
European Environment Bureau assesses critical nanotechnology governance issues  
<http://www.nanowerk.com/news/newsid=13044.php>

6.9.4 EC's DEEPEN Final Report on Nanotech Development Ethics Released

The release of the Final Report from the EC-funded DEEPEN Project has been announced. The project characterizes itself as "Europe's leading research partnership for integrated understanding of the ethical challenges posed by emerging nanotechnologies in real world circumstances, and their implications for civil society, for governance, and for scientific practice."

**Military Implications:**

[Similar to others on this issue] Military personnel concerned with nanotech risks and applications should review this document for its potential relevance to future nanotech-related regulations and research approaches in the field.

**Sources:**

DEEPEN Final Report released 28th September 2009  
<http://www.geography.dur.ac.uk/projects/deepen/NewsandEvents/tabid/2903/Default.aspx>  
Nanotechnology Decision-Making Needs Greater Public Involvement  
<http://www.azonano.com/news.asp?NewsID=13873#>



#### 6.9.5 EC Presentations on Risk Assessment of Nanotechnologies

The presentations from the European Commission (DG Health and Consumers) Scientific Hearing on the risk assessment of nanotechnologies have been posted on the DG Health and Consumer's website. The topics are:

The Role of EU Scientific Committees for Risk Assessment of Nanomaterials

( < [http://ec.europa.eu/health/ph\\_risk/nanotechnology/docs/ev\\_20091103\\_co01\\_en.pdf](http://ec.europa.eu/health/ph_risk/nanotechnology/docs/ev_20091103_co01_en.pdf) > )

Public Consultation on Risk Assessment of Nanotechnologies: Summary of contributions

( < [http://ec.europa.eu/health/ph\\_risk/nanotechnology/docs/ev\\_20091103\\_co02\\_en.pdf](http://ec.europa.eu/health/ph_risk/nanotechnology/docs/ev_20091103_co02_en.pdf) > )

(Scientific) Comments on the Public Consultation's Summary

( < [http://ec.europa.eu/health/ph\\_risk/nanotechnology/docs/ev\\_20091103\\_co03\\_en.pdf](http://ec.europa.eu/health/ph_risk/nanotechnology/docs/ev_20091103_co03_en.pdf) > )

#### **Military Implications:**

[Similar to others on this issue] Relevant military personnel should review the documents for their potential relevance to future nanotech-related regulations.

#### 6.9.6 NC Summit to Focus on Environmentally Responsible Development of Nanotech

The Research Triangle Environmental Health Collaborative's second annual environmental health summit in early October focused on Environmentally Responsible Development of Nanotechnology. According to Nanowerk News, it brought together 150 experts from around the US "to address critical issues in nano-enabled product development and manufacturing ... [to] overcome barriers to success related to environmental/occupational health concerns." and produce a guidance document with recommendations about how to successfully address the critical issues. That document will be available

at <http://environmentalhealthcollaborative.org/summit/summit-2009/>.

#### **Military Implications:**

[Similar to others on this issue] Relevant military personnel should review the outcomes of the meeting for their potential relevance to future nanotech-related regulations.

#### **Source:**

Industry leaders gather in North Carolina to focus on environmentally responsible development of nanotechnology

<http://www.nanowerk.com/news/newsid=12947.php#>

#### 6.9.7 Report Suggests Current Nanotech Protective Gear May Not Be Adequate

In a paper to be published in a journal next year, Patricia Dolez of the Dept. of Mechanical Engineering, at the École de technologie supérieure, in Montréal, and colleagues, point out possible problems with the adequacy of current workplace protective equipment when dealing with nanomaterials in the environment, and suggest that further research is needed into these special risks.

#### **Military Implications:**

[Similar to others on this issue] Relevant military personnel should review the paper for potential relevance to future nanotech-related regulations.

**Source:**

Current safety equipment may not be adequate for nanoprotection

<http://www.nanowerk.com/news/newsid=13054.php>

Paper in the International Journal of Nanotechnology (Int. J. Nanotechnol., 2010, 7, 99-117) (Not yet available at the time of this writing)

**6.9.8 French Public Debate on Nanotechnology**

The French Commission of Public Debates has launched a public debate on nanotechnology, with seventeen meetings to be held around France, starting in mid-October, and running through February 2010. Each of the meetings will be organized around a different topic, but participants will be free to raise other issues. Planned subjects include European regulation of nanotechnology, nanostructured materials, consumer and workplace protection, nanoparticles in the organism, and ethics and governance. The project is supported by a Web site (in French) <<http://www.debatpublic-nano.org/>>.

**Military Implications:**

[Similar to others on this issue] Military personnel in the European theater concerned with nanotechnology should consider attending selected meetings and should keep in contact with this project to acquire a sense of French public opinion toward nanotech.

**Source:**

France launches public debate on nanotechnology

<http://www.cosmeticsdesign-europe.com/Formulation-Science/France-launches-public-debate-on-nanotechnology>

**6.9.9 European Project to Study Metal Oxide Nanoparticle Risks**

According to an item in Nanowerk News, CIC biomaGUNE, the Centre for Cooperative Research in Biomaterials, in Guipúzcoa, Spain, is to lead the European FP7 project HINAMOX (Health Impact of Engineered Metal and Metal Oxide Nanoparticles: Response, Bioimaging and Distribution at Cellular and Body Level). The aim of the three-year project is to evaluate the possible impact on health of metal oxide nanoparticles, including zinc, cerium, titanium and iron oxides.

**Military Implications:**

[Similar to others on this issue] Military personnel concerned with nanotech risk assessment should follow this project to incorporate its findings into their work.

**Sources:**

European project evaluates possible health impact of metal oxide nanoparticles

<http://www.nanowerk.com/news/newsid=12904.php#>

CIC biomaGUNE is to lead a european project that will test the toxicity of the nanoparticles in metal oxides

[http://www.cicbiomagune.es/secciones/noticias/noticias\\_detalle.php?idioma=en&id\\_noticia=33](http://www.cicbiomagune.es/secciones/noticias/noticias_detalle.php?idioma=en&id_noticia=33)

**6.9.10 Norwegian Research Group Launches Nanotech Particles Project**

The SINTEF Group, the largest independent research organization in Scandinavia, has established a project, 'The environmental fate and effects of SINTEF-produced nanoparticles', to

investigate the behavior and effects of nanoparticles in marine environments. Several other nanotech-oriented efforts are also underway in the Group.

**Military Implications:**

[Similar to others on this issue] Military personnel should contact SINTEF and arrange to keep in touch with the organization's research projects.

**Sources:**

Nanoparticles - toxic or harmless?

<http://www.nanowerk.com/news/newsid=12802.php#>

SINTEF Group

<http://www.sintef.no/Home/>

6.9.11 New Nanotech Survey Book Covers Environmental Aspects

A new book, Nano-Society - Pushing the boundaries of technology (ISBN: 978-1-84755-883-1), surveys 122 nanotech research projects, grouped into four sections, one of which, Simply Green – Environmental Applications and Risk Management, covers Green nanotechnology, Dealing with pollution, Energy – renewable and clean, and Nanotoxicology – assessing the risks.

**Military Implications:**

Military personnel concerned with nanotech questions should review this book for its insights into the current state of research in the field.

**Sources:**

Nano-Society. Pushing the Boundaries of Technology

<http://www.rsc.org/Shop/books/2009/9781847558831.asp>

Nano-Society - Pushing the boundaries of technology (News story)

<http://www.nanowerk.com/spotlight/spotid=12798.php#>

## **6.6 Russia to Boost Its Space Security Program**

Russia Needs To Add Asteroid Hazard Study To National Space Program - Opinion

MOSCOW, October 6 (Itar-Tass) -- It is time for Russia to supplement the national space program with the study of the asteroid hazard and possible ways to protect the Earth, said participants in the State Duma hearings on planetary security.

The asteroid hazard, which had been sporadically catching the public eye since the end of the 19th century, caused profound concern of researchers several years ago when Asteroid Apophis was discovered.

Asteroid Apophis may pass dangerously close from the Earth in 2029, press secretary of the Russian Academy of Sciences' Main Astronomical Observatory Sergei Smirnov told Itar-Tass.

"According to the preliminary estimates, it will pass ten times closer than the distance between the Earth and the Moon," he said.

"Obviously, the 600-meter boulder will do nothing good, especially as it is planned to position telecom satellite platforms on the geo-stationary orbit by that time. It is now impossible to calculate the prospective orbit of the asteroid right now," Smirnov said.

"Apophis is expected to come close in 2012 as well, and then its orbit of 2029 will be calculated more precisely. We need to know the asteroid's trajectory with the precision of tens of meters in order to say for sure whether it may hit the Earth or not," he said.

"The International Astronomy Union has urged mankind to make a comprehensive analysis of the asteroid danger. The Applied Astronomy Institute of the Russian Academy of Sciences, which coordinates the research of small planets and the asteroid danger, has produced a catalog of 300 potentially dangerous asteroids and comets," he said.

The catalog gives information about speeds of celestial bodies and a potential impact of their theoretical collision with the Earth, he said. Each day the Earth comes closer to at least one of nearly 100,000 small planets, which have been discovered since 1801, and each year tens of tonnes of meteorite substance lands on the Earth, Smirnov said.

As of April 16, 2008, the Apophis impact probability for April 13, 2036, was calculated as 1 in 45,000. An additional impact date in 2037 was also identified; the impact probability for that encounter was calculated as 1 in 12.3 million. Many scientists agree that Apophis warrants closer scrutiny and, to that end, in February 2008 the Planetary Society awarded \$50,000 in prize money to companies and students who submitted designs for space probes that would put a tracking device on or near the asteroid

After the Minor Planet Center confirmed the June discovery of Apophis, the next close approach was computed to be April 13, 2029, by the automatic Sentry system of NASA's Near-Earth Object Program Office. NEODyS, a similar automatic system at the University of Pisa, Italy and the University of Valladolid, Spain also calculated this same approach date. On that date, it will become as bright as magnitude 3.3 (visible to the naked eye from rural and some darker suburban areas, visible with binoculars from most locations). This close approach will be visible from Europe, Africa, and western Asia.

On Friday, April 13, 2029, Apophis will pass Earth within the orbits of geosynchronous communication satellites. It will return for another close Earth approach in 2036.

NASA initially estimated the energy that Apophis would have released if it struck Earth as the equivalent of 1,480 megatons of TNT. A later, more refined NASA estimate was 880 megatons. The impacts, which created the Barringer Crater or caused the Tunguska event are estimated to be in the 3-10 megaton range. The 1883 eruption of Krakatoa was the equivalent of roughly 200 megatons.

The exact effects of any impact would vary based on the asteroid's composition, and the location and angle of impact. Any impact would be extremely detrimental to an area of thousands of square kilometers, but would be unlikely to have long-lasting global effects, such as the initiation of an impact winter.

Head of the Planetary Protection Center Anatoly Zaitsev admitted that collisions with asteroid were very rare and happened once in several hundreds of thousands or even millions of years. Yet the Earth should stay alert, he said. "In fact, a catastrophe may happen any moment. Only 6,300 out of approximately two million asteroids with the size exceeding 50 meters have been discovered," the researcher said.

Russia has several options. It may hope for a miracle and do nothing, or it may assign funds for studying the problem and evaluating the possibility of the collision, or it may create a planetary protection system. The system, codenamed Citadel, must at least detect dangerous asteroids before they reach the solar system or, ideally, change the asteroids' orbits and destroy them with thermonuclear charges. The orbit change is more preferable, as fragments of a large asteroid would still pose a lethal danger to the Earth.